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AUSTRALIAN CARABID BEETLES VIII. *LEIRADIRA*, ESPECIALLY THE TROPICAL SPECIES

BY P. J. DARLINGTON, JR.

Museum of Comparative Zoology, Cambridge, Mass.

This is the third part of this series to be devoted to flightless Carabidae of zoogeographic importance from tropical eastern Australia. Pertinent earlier parts, including a locality list and a discussion of transition of carabid faunas in wet forests from New Guinea to Tasmania, are listed at the end of the present paper. Information on deposition of types and a brief note on methods will be found at the beginning of Part VI (1961c).

The present paper is concerned with the pterostichine genus *Leiradira*. Typical *Leiradira* are very distinctive Carabidae, distinguished from (for example) *Notonomus* by: deep-bodied form; heavy, sometimes more or less deflexed head, with mandibles somewhat longer and more acuminate than in *Notonomus*; geniculate antennae; mentum tooth absent; and inner lobe of maxilla lined with what look like long slender teeth rather than bristles (see following key). These characters led Tschitschérine (1902, p. 506) to place *Leiradira* in the tribe Deliniini, far removed from *Notonomus*. However, some of my new North Queensland species reduce the gap between *Leiradira* and *Notonomus* and suggest that tribal separation of the two genera may not be justified and that, although the genera are distinct, they (and *Delinius*) may be derived from a common ancestor. This is something to be decided in the future, by the next reviser of the generic classification of Australian Pterostichini.

As I now understand the genus, *Leiradira* (in a broad sense) includes about a dozen species and is discontinuously distributed, chiefly in rain forest, along the eastern edge of Australia from just below Cooktown in tropical North Queensland south at least to the lower edge of the Dorrigo plateau in warm temperate

7. Odd elytral intervals wider than even ones; elytral striae not much widened; 3rd elytral intervals usually 3- or 4-punctate; scutellar striae weak or obsolete (variable); form more slender..... *alternans*
- Elytral intervals nearly equal; elytral striae widened and opaque especially behind middle; 3rd elytral intervals always 2-punctate; scutellar striae short but deep; form less slender *opacistriatus*
8. Larger (14.7 mm. or more) *violaceus*
- Smaller (c. 10-12 mm.) 9
9. Prothorax wider (W/L 1.14-1.19); duller *jacobi*
- Prothorax narrower (W/L 1.06-1.08); more shining..... *tenuis*

Of the three subgenera, *Mctadira* is most like *Notonomus*. Even the least modified *Mctadira*, *aurifer*, differs from *Notonomus* in having a shorter mentum tooth and a regular row of about 8 slender tooth-like processes on inner edge of maxilla instead of more than 20 thickened setae less regularly arranged as in, for example, *Notonomus doddi* Sloane, but there are two indications besides the general similarity that suggest a real relationship. One is the position of the posterior-lateral prothoracic setae, on (not inside of) the thickened margin at basal angles in both *Mctadira* and the tropical species of *Notonomus*. The other is the fact that some *Mctadira* and some tropical *Notonomus* have elytral striae conspicuously widened and opaque. This is an unusual character, unlikely to have evolved independently in the two genera.

METADIRA subgen. n.

Form varying from that of a convex *Notonomus* to that of typical *Leiradira*. *Head* stout, sometimes somewhat deflexed; eyes small, genae prominent (but variable); 2 supraocular setae each side; mandibles varying (in different species) in length and curvature; labrum moderately emarginate, 6-setose; antennae with basal segment varying (in different species) from shorter to longer than next 2 segments together; frontal foveae short but well defined; mentum tooth very short and broad, broadly emarginate; inner lobe of maxilla with single row of setae so thickened as to resemble long slender teeth; palpi slender in both sexes. *Prothorax* cordate, with narrow margins; baso-lateral impressions small but deeply impressed; usual 2 marginal setae each side, posterior ones on thickened margins at basal angles. *Elytra* usually with (sometimes almost without) basal margin; humeri \pm dentate; striae entire, narrow or widened (in different species); intervals equal or unequal (in different species); narrow 10th

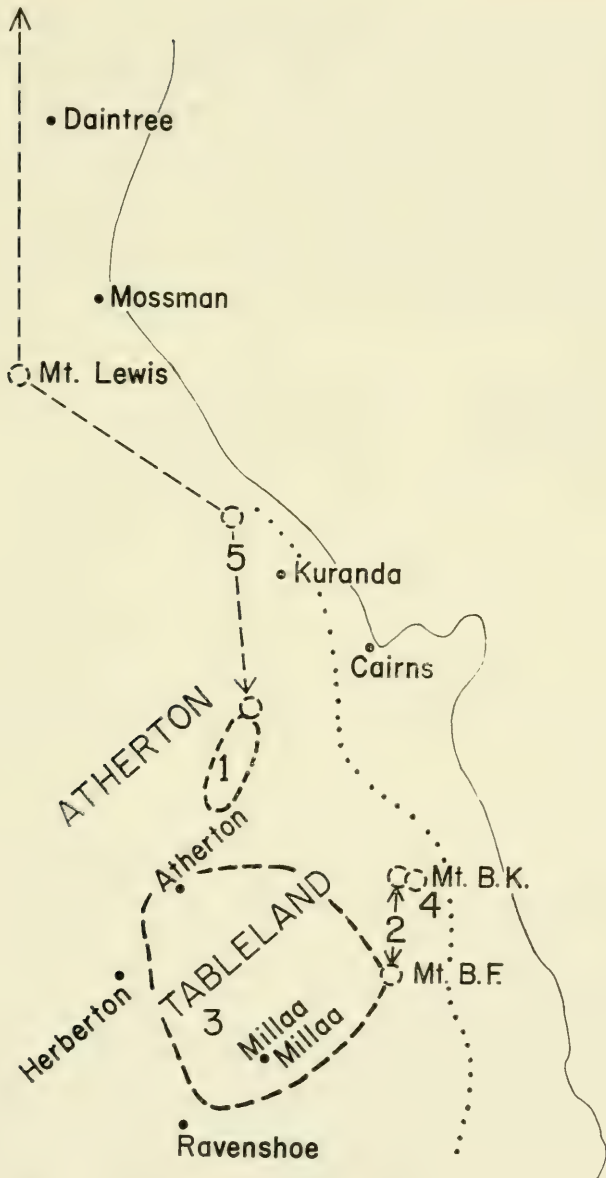
interval present or indicated posteriorly; 3rd interval typically with 2 dorsal punctures (usually only 1 in *alticola* and *soror*, and usually 3 or 4 in *alternans*). Last 3 ventral segments weakly, variably sub-impressed across base but not sulcate; mesosternum and prosternal process not setose. Male with anterior tarsi slightly dilated, 3 segments with squamae; ♂ with 1, ♀ 2 setae each side last ventral segment.

Genotype: *Leiradira aurifer* Darlington (below).

Five species of this subgenus are now known. All occur on (different parts of) the Atherton Tableland/or Mts. Bartle Frere and Bellenden Ker (see map) and the northernmost of the five species extends north nearly to Cooktown. Three of the species (*alternans*, *soror*, *opacistriatus*) may be (distinct) geographical forms of one original widely distributed stock (see notes under *alternans*). The other two species are very distinct, localized endemics. All the species are usually found (by day) under cover on the ground, in rain forest, but I got one *opacistriatus* in good savannah woodland a few hundred feet outside rain forest by the Davies Creek Road.

LEIRADIRA (METADIRA) AURIFER n. sp.

Form as figured (Fig. 1), of a rather convex *Notonomus*, but with characters of *Metadira* as given above; head and pronotum bright green, pronotum with variable purplish reflections, elytra dark copper-purple, lower surface and legs black, mouth parts and antennae brownish; surface shining, except bottoms of striae opaque. *Head* $\frac{7}{10}$ or slightly less width prothorax; mandibles shorter than usual in *Leiradira*, rather strongly curved, acuminate apically; eyes moderate (in genus), genae *c.* wide as eyes, weakly rounded to neck; 1st antennal segment *c.* $\frac{2}{5}$ (by measurement) length of 2nd + 3rd segments together; middle segments nearly 2X long as wide. *Prothorax c.* $\frac{1}{10}$ (\pm) wider than long at middle, moderately narrowed behind, more in front; base *c.* $\frac{1}{10}$ wider than apex; apex subtruncate or very broadly emarginate with angles scarcely advanced, margined only near sides; base slightly sinuously subtruncate, deeply margined toward sides but not at middle; sides broadly rounded for much of length, sinuate near base; basal angles *c.* right, scarcely blunted; disc moderately convex with middle line distinct and reaching base,



Known distribution of *Leivadira*, endemic subgenus *Meladira*, in North Queensland. The finely dotted line is the approximate eastern edge of high land (the Atherton Tableland etc.). No. 1, *aurifer*; 2, *alticola*; 3, *alternans*; 4, *soror*; 5, *opacistriatus*, which occurs also north beyond the limits of the map almost to Cooktown.

transverse impressions almost obsolete, and baso-lateral impressions short, linear, connected with side margins by deeply impressed marginal grooves. *Elytra* $\frac{1}{4}$ (or slightly more) wider than prothorax; basal margin entire, strongly raised, slightly scalloped, rectangular at subdentate humeri; striae very wide and opaque especially posteriorly; intervals convex, very unequal, odd ones several times wider than even, 7th strongly convex but not sharply carinate at base; a narrow 10th interval present posteriorly; each 3rd interval usually 2-punctate just behind middle and near apex (an additional puncture present near middle on 1 side in 1 specimen). Length 15-19; width 5.0-6.2 mm.

Holotype ♂ (M.C.Z. Type No. 30,382) and 9 paratypes from mountains north of Kairi, Atherton Tableland, North Queensland, 3000-4000 ft., Dec. 1957; and 3 paratypes from south end of Davies Creek road, Atherton Tableland, Dec. 1957; all specimens taken by myself, in rain forest. The two localities are not far apart in the mountain mass that lies on the Atherton Tableland between the Marceba-Kuranda road on the north and Yungaburra-Lake Barrine road on the south.

See preceding discussion and key for place of this species among other *Leiradira*. Although it has striking specific characters (color, extreme alternation of elytral intervals), it is the least specialized member of the group in form, mandibles, and length of 1st antennal segment.

LEIRADIRA (METADIRA) ALTICOLA n. sp.

Form as figured (Fig. 2), prothorax strongly cordate, elytra narrowed anteriorly; rather strongly convex; black, usually with purplish tinge, margins of elytra blue; moderately shining. *Head* c. $\frac{3}{4}$ or slightly less width prothorax; mandibles slightly longer and less curved than in *aurifer*; eyes small, genae usually longer and more prominent than eyes, strongly convex; antennae very short, 1st segment slightly longer than next 2 together (by measurement), outer segments scarcely longer than wide. *Prothorax* slightly (less than $\frac{1}{10}$) wider than long at middle; apex truncate with angles scarcely advanced, not margined; base virtually truncate, strongly margined toward sides; sides arcuate for c. $\frac{3}{4}$ of length (sometimes subparallel near middle), strongly sinuate c. $\frac{1}{6}$ or more of length before base, then parallel or diverging to base; basal angles well defined, right or acute; disc with middle line well impressed, very deep basally, transverse impressions

obsolete, baso-lateral impressions deep, sublinear, connected with side margins by deep basal grooves. *Elytra* c. $\frac{1}{3}$ (or slightly less) wider than prothorax, narrowed basally; basal margins entire, scalloped, forming sharply defined right angles at subdentate humeri; striae narrow, slightly wider apically, with a little dull sculpture at bottom; intervals subequal, slightly convex; 3rd interval with 1 puncture near or behind middle, usually without posterior puncture, but latter present on 1 side in 1 individual (see Fig. 2). Parts of lower surface (sides of mesosternum, first ventral segment, and parts of other ventral segments) more or less punctate or subpunctate. Length 15-19; width 5.2-6.5 mm.

Holotype ♂ (M.C.Z. Type No. 30,383) and 3 paratypes from Mt. Bellenden Ker, E. side, 3000-4500 ft., Jan. 1958, and 1 paratype, Mt. Bartle Frere, W. slope, near 5000 ft., Dec. 1957. These 2 mountains are close together at the eastern edge of the Atherton Tableland south of Cairns, North Queensland. All specimens taken by myself, in mountain rain forest.

Distinguished from other *Leiradira* as indicated in the preceding key; unique in form, and notable for very short antennae.

LEIRADIRA (METADIRA) ALTERNANS Darlington

This species (Fig. 3) was described by me in 1953 (p. 90) from Malanda etc. It is widely distributed on the central-southern Atherton Tableland, the limits of its known distribution being Atherton, Lake Barrine, the lower western slope of Mt. Bartle Frere, and Mt. Fisher southwest of Millaa Millaa. It may be represented by *soror* (below) on the eastern slope of Mt. Bellenden Ker (and perhaps elsewhere on the eastern slope of the Tableland) and by *opacistriatus* on the northern edge of the Tableland and northward.

LEIRADIRA (METADIRA) SOROR n. sp.

Small, slender, convex; shining black with silky lustre but no distinct metallic color. *Head* $\frac{3}{4}$ (\pm) width prothorax; mandibles relatively weakly arcuate; eyes small, genae slightly more prominent than eyes, broadly convex; antennae with 1st segment longer than next 2 together. *Prothorax* narrowly subcordate, as long as or slightly longer than wide; apex subtruncate with angles scarcely advanced, not margined at middle; base subtruncate except slightly rounded toward sides, not margined

except near sides; sides broadly arcuate, subparallel before middle, strongly sinuate about $\frac{1}{10}$ of length before base; basal angles c. right, scarcely blunted; disc with middle line rather fine but reaching base, transverse impressions weak, baso-lateral impressions nearer sides than middle, linear, deep, joining lateral margins at base. *Elytra* $\frac{3}{10}$ (or less) wider than prothorax, subparallel, weakly narrowed anteriorly; basal margin deep, scalloped, rectangular at subdentate humeri; striae fine; intervals convex, subequal; 3rd interval usually 1-punctate slightly behind middle, posterior punctures usually absent (1 present on 1 side in 1 specimen). Parts of lower surface (sides of mesosternum, 1st ventral segment, parts of other ventral segments) variably punctate. Length 11.0-12.5; width 3.3-3.7 mm.

Holotype ♂ (M.C.Z. Type No. 30,384) and 2 paratypes all from E. side Mt. Bellenden Ker, c. 3000 ft., North Queensland, Jan. 1958, taken by myself in rain forest.

This species most resembles *alternans* (above) but is smaller, narrower, with less alternation of elytral intervals, and fewer punctures on 3rd elytral interval.

LEIRADIRA (METADIRA) OPACISTRIATUS (Sloane)

Sloane first (1902, p. 319) described this species in *Notonomus*, then (1913, p. 409) ruled it out of that genus. The types were said to be from Cairns, collected by Froggatt; they probably really came from the mountains near Cairns. I could not locate the types in Australia, but my specimens fit the description reasonably well. They are from the Davies Creek road on the northern Atherton Tableland; near Black Mt. about 20 miles north of Kuranda (these are probably virtual topotypes); Mt. Lewis southwest of Mossman; and Mt. Finnegan south of Cooktown.

LEIRADIRA, *sensu stricto*

Castelnau 1867, p. 72.

Csiki 1929, p. 500 (see for additional references and list of previously described species).

Genotype, by present designation: *Leiradira auricollis* Castelnau (Fig. 4) (genus originally based on this species and *latricillei* Castelnau).

Leiradira, sensu stricto apparently occurs only below the tropics, from the Blackall Range etc. in South Queensland south at least to the lower (eastern) edge of the Dorrigo plateau. The

subgenus includes at least three full species, perhaps more. I have not studied them and cannot establish synonymies.

Subgenus STOMIMORPHUS Straneo

Straneo 1953, p. 1.

Leiradira-like Carabidae with mandibles long, acuminate; labrum deeply emarginate, 6-setose; mentum tooth present but short, broad; antennae with 1st segment longer than 2nd + 3rd together; posterior-lateral setae of pronotum inside thickened margin.

Genotype: *Stomimorphus violaceus* Straneo.

This subgenus is apparently confined to southern and central eastern Queensland. The type locality of *violaceus* is simply Queensland. I have what may be this species from Maleny, on the Blackall Range, and additional, smaller species are described here from Mt. Jacob and the Eungella Range.

LEIRADIRA (STOMIMORPHUS) VIOLACEUS (Straneo)

Straneo 1953, p. 1.

Described as violaceous; length 14.7 by 4.9 mm. The unique type is a ♂ from "Australia, Queensland" in the Straneo Collection. Two specimens that I collected near Maleny, on the Blackall Range, South Queensland, in rain forest, are greenish violaceous and larger than the type, but I hesitate to describe them without more material to show extent of variation.

LEIRADIRA (STOMIMORPHUS) JACOBI n. sp.

Form as figured (Fig. 5); labrum, mentum tooth, and other characters as described for *Stomimorphus*; head and prothorax greenish black, elytra purplish darker dorsally, lower surface and appendages dark; moderately shining, elytra slightly duller and with distinct, fine reticulate microsculpture. *Head* not quite $\frac{3}{4}$ (c. .72) width prothorax. *Prothorax* subcordate, slightly less than $\frac{1}{5}$ wider than long at middle, width/length 1.14-1.19; apex subtruncate; base slightly emarginate at middle and rounded toward sides; base and apex not distinctly margined; sides broadly rounded for most of length, slightly sinuate before base; basal angles slightly obtuse, slightly blunted; disc convex, middle line fine, transverse impressions weak, baso-lateral impressions linear, moderately impressed, not punctate. *Elytra* $\frac{1}{4}$ (or more)

wider than prothorax, slightly narrowed anteriorly; basal margins entire, forming obtuse-right angles at humeri; latter finely bluntly subdentate; striae moderately impressed, entire, not punctate; dorsal intervals equal, slightly convex; 10th interval present posteriorly; 3rd intervals 2-punctate in all specimens, near middle and posterior $\frac{3}{4}$ (but position of punctures slightly variable). Secondary sexual characters normal, i.e. ♂ with anterior tarsi slightly dilated with 3 segments squamulose below; and ♂ with 1, ♀ 2 setae each side apex last ventral segment. Length 9.8-12.0; width 3.3-4.1 mm.

Holotype ♂ (M.C.Z. Type No. 30,385) and 9 paratypes all from Mt. Jacob, c. 45 miles south of Gladstone, South Queensland, c. 2000 ft. altitude, Mar. 1958, taken by the Darlingtons, in rain forest.

Superficially this species is deceptively similar to *Leiradira*, *sensu stricto*, but the species' technical characters are as in *Stomimorphus*.

LEIRADIRA (STOMIMORPHUS) TENUIS n. sp.

Form as figured (Fig. 6); with characters of *Stomimorphus* as here given; dark purplish, lower surfaces and appendages dark; shining, elytra with faint fine microreticulation. *Head* $\frac{3}{4}$ or slightly less width prothorax. *Prothorax* narrow, width/length 1.06-1.08 (all specimens); apex subtruncate or very broadly emarginate; base broadly emarginate at middle, slightly rounded toward sides; base and apex not distinctly margined; sides weakly arcuate for much of length, slightly sinuate near base; disc with fine middle line, very weak transverse impressions, moderate linear baso-lateral impressions, not punctate. *Elytra* c. $\frac{1}{3}$ wider than prothorax; basal margin entire, forming slightly obtuse (nearly right) angles at humeri; latter bluntly subdentate; striae entire, moderately impressed, not punctate; intervals slightly convex, subequal; 10th interval present posteriorly; 3rd interval 2-punctate, near middle and apical $\frac{3}{4}$. Length 10.0-11.5; width 3.3-3.5 mm.

Holotype ♀ (M.C.Z. Type No. 30,386) and 2 ♀ ♀ paratypes all from the Eungella Range, west of Mackay, Queensland, 2000-3000 ft., Nov. 1957, taken by the Darlingtons, in rain forest.

This resembles and may be related to *jacobi* (above) but the prothorax of the present species is narrower and the elytra more shining.

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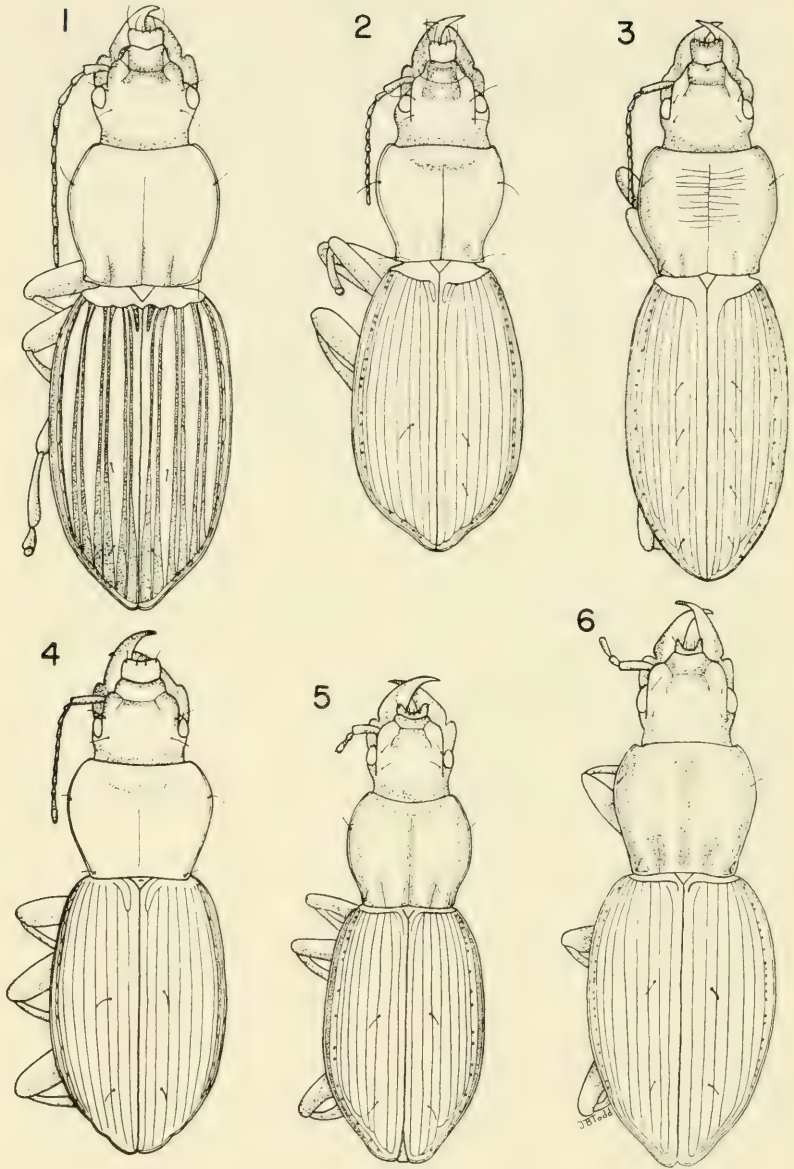


Fig. 1. *Leiradira* (*Metadira*) *aurifer* n. sp.
 Fig. 2. *Leiradira* (*Metadira*) *alticola* n. sp.
 Fig. 3. *Leiradira* (*Metadira*) *alternans* Darlington
 Fig. 4. *Leiradira* (*sensu stricto*) *auricollis* Castelnau
 Fig. 5. *Leiradira* (*Stomimorphus*) *jacobi* n. sp.
 Fig. 6. *Leiradira* (*Stomimorphus*) *tenuis* n. sp.